

WHAT WE CLAIM IS:

1. A lithographic apparatus, comprising:
an illumination system that supplies a projection beam of radiation;
patterning means for imparting the projection beam with a pattern in its cross-section;
second patterning means for imparting a second beam of radiation supplied by the illumination system with a second pattern;
a substrate table that supports a substrate;
a projection system that projects the patterned beams onto a target portion of the substrate; and
a radiation distribution device that distributes the radiation from the illumination system to the patterning means;
wherein the radiation distribution device has a duty cycle during which it sequentially directs substantially all of the radiation from the illumination system to each of a plurality of radiation distribution channels in turn, and wherein the radiation distribution channels provide the beams of radiation to the patterning means.
2. A lithographic projection apparatus according to claim 1, wherein the apparatus includes at least three patterning means for imparting a pattern to a beam of radiation supplied by the illumination system and radiation is provided to each by the radiation distribution channels.
3. A lithographic projection apparatus according to claim 2, wherein at least one of said radiation distribution channels directs radiation to a single one of said patterning means.
4. A lithographic projection apparatus according to claim 1, wherein at least one of said radiation distribution channels includes a beam

splitter that divides the radiation directed into said radiation distribution channel and distributes it to a plurality of patterning means.

5. A lithographic projection apparatus according to claim 1, further comprising:

a driver that rotates the reflector, wherein the radiation distribution device comprises a reflector, rotatably mounted in the path of the beam of radiation from the illumination system and arranged such that as the reflector rotates the reflected beam of radiation changes direction, distributing it to each of the radiation distribution channels in turn.

6. A lithographic projection apparatus according to claim 5, wherein the illumination system is arranged to provide pulses of radiation at substantially regular intervals, and wherein the driver rotates the reflector at a substantially constant speed, synchronized to the pulse rate of the illumination system such that during each pulse the reflected beam of radiation is reflected to one of said radiation distribution channels.

7. A lithographic projection apparatus according to claim 1, further comprising:

a driver that rotates the plurality of reflectors, wherein the radiation distribution device comprises a plurality of reflectors rotatably mounted about an axis such that, as the radiation distribution device rotates, each reflector in turn passes into the path of the beam of radiation from the illumination system for a given time, during which the reflected beam of radiation changes direction, distributing it to each of the radiation distribution channels in turn.

8. A lithographic projection apparatus according to claim 7, wherein the illumination system is arranged to provide pulses of radiation at substantially regular intervals, wherein the driver rotates the plurality of reflectors at a substantially constant speed, synchronized to the pulse rate of

the illumination system such that during each pulse the reflected beam of radiation is reflected to one of said radiation distribution channels by one of said reflectors.

9. A lithographic projection apparatus according to claim 8, wherein, during successive pulses of the illumination system, the beam of radiation from the illumination system is incident on different reflectors of said plurality of reflectors, wherein each reflector is associated with one of the radiation distribution channels and arranged such that, during a given one of said pulses of the illumination system associated with said reflector, the reflector is at an angle relative to the beam of radiation from the illumination system such that the beam is reflected to said associated one of the radiation distribution channels.

10. A lithographic projection apparatus according to claim 8, wherein the plurality of reflectors rotate such that successive pulses of radiation are incident on different reflectors and, at successive pulses of the illumination system that are incident on each reflector, the reflector is at different angles relative to the beam of radiation such that the radiation is directed to different radiation distribution channels.

11. A lithographic projection apparatus according to claim 1, wherein at least one of the patterning means is an array of individually controllable elements that can be set to impart a beam of radiation with a desired pattern in its cross-section.

12. A lithographic projection apparatus according to claim 1, wherein said projection system includes at least first and second projection system sub-units for independently projecting the patterned beams of radiation onto separate target portions of the substrate.

13. A lithographic projection apparatus according to claim 1, wherein said projection system includes a common element for projecting the patterned beams onto the substrate.

14. A lithographic projection apparatus according to claim 1, wherein at least one radiation distribution channel includes a liquid light guide and optical means for collecting light from the radiation distribution system and directing it to one of the patterning means.

15. A lithographic projection apparatus according to claim 1, wherein the illumination system comprises at least two radiation sources, each providing a source beam of radiation, and a beam combiner that combines said source beams of radiation to form the beam of radiation provided by the illumination system.

16. A lithographic projection apparatus according to claim 15, wherein said beam combiner includes a radiation beam integrator that ensures substantially uniform intensity in the beam of radiation formed from combining said source beams of radiation even if said source beams have different intensities to each other.

17. A lithographic apparatus comprising:
an illumination system that supplies a projection beam of radiation;
patterning means for imparting the projection beam with a pattern in its cross-section;
second patterning means for imparting a second beam of radiation supplied by the illumination system with a second pattern;
a substrate table that supports a substrate;
a projection system that projects the patterned beams onto a target portion of the substrate; and

a radiation distribution device that distributes the radiation from the illumination system to the patterning means, wherein the radiation distribution device includes a beam divider that divides the beam of radiation from the illumination system into a plurality of portions, each of which is directed to a distribution channel, and wherein the radiation distribution channels provide the beams of radiation to the patterning means and the beam divider comprises a plurality of partially reflective surfaces through which the beam of radiation from the illumination system is successively directed, each said partially reflective surface associated with one of the radiation distribution channels and reflecting a portion of the beam of radiation to said radiation distribution channel.

18. A lithographic projection apparatus according to claim 17, wherein the proportions of the beam of radiation from the illumination system which are reflected by each of the successive partially reflective surfaces to the associated radiation distribution channels are arranged such that substantially equal proportions of the intensity of the beam of radiation from the illumination system are directed to each of radiation distribution channels.

19. A lithographic projection apparatus according to claim 17, wherein each of the partially reflective surfaces is arranged on one end of a section of material that is substantially transparent to the radiation, at an angle to the beam of radiation from the illumination system such that a proportion of the radiation incident on each of the partially reflective surfaces is deflected to the associated radiation distribution channel and the remainder passes through to a next section of transparent material.

20. A lithographic projection apparatus according to claim 19, wherein a final section of transparent material comprises a fully reflective surface that reflects substantially all of the radiation directed into said section to one of the radiation distribution channels.

21. A lithographic projection apparatus according to claim 17, wherein each of said radiation distribution channels directs the radiation to a single one of said patterning means.

22. A lithographic projection apparatus according to claim 17, wherein at least one of the patterning means is an array of individually controllable elements that can be set to impart a beam of radiation with a desired pattern in its cross-section.

23. A lithographic projection apparatus according to claim 17, wherein said projection system includes at least first and second projection system sub-units that independently projects the patterned beams of radiation onto separate target portions of the substrate.

24. A lithographic projection apparatus according to claim 17, wherein said projection system includes a common element that projects the patterned beams onto the substrate.

25. A lithographic projection apparatus according to claim 17, wherein at least one radiation distribution channel includes a liquid light guide, and optical means for collecting light from the radiation distribution system and directing it to one of the patterning means.

26. A lithographic projection apparatus according to claim 17, wherein the illumination system comprises at least two radiation sources, each providing a source beam of radiation, and a beam combiner that combines said

source beams of radiation to form the beam of radiation provided by the illumination system.

27. A lithographic projection apparatus according to claim 26, wherein said beam combiner includes a radiation beam integrator that ensures substantially uniform intensity in the beam of radiation formed from combining said source beams of radiation even if said source beams have different intensities to each other.

28. A device manufacturing method comprising the steps of:
providing a projection beam of radiation using an illumination system;
using patterning means to impart the projection beam with a pattern in its cross-section;

using second patterning means to impart a second projection beam of radiation supplied by the illumination system with a second pattern in its cross-section;

projecting the patterned beams onto a target portion of a substrate; and
using a radiation distribution device to distribute the radiation from the illumination system to the patterning means, wherein the radiation distribution device has a duty cycle during which it sequentially directs substantially all of the radiation from the illumination system to each of a plurality of radiation distribution channels in turn, wherein the radiation distribution channels provide the beams of radiation to the patterning means.